

A nighttime photograph of a city street. In the foreground, a large yellow trolleybus maintenance vehicle with a long boom is positioned in the middle of the road, its boom extended upwards. To its right, another smaller yellow maintenance vehicle is parked. The street is illuminated by the vehicles' headlights and streetlights. Trees line the sidewalks, and a few cars are parked along the street. The background shows buildings and more trees.

CONTRIBUTION OF KUMMLER+MATTER AG TO THE SUSTAINABILITY TRENDS OF TROLLEYBUSSES NETWORKS

Kummler+Matter

A COLAS RAIL COMPANY

TROLLEYMOTION CONFERENCE

October 23rd 2024

A photograph of a large industrial building at night. The building's facade is dark, but the name 'Kummler+Matter' is illuminated in large, bright orange, three-dimensional letters. Below the letters, a white metal fence runs across the foreground. Behind the fence, there are some trees and industrial equipment, including what looks like a yellow crane or lift. The sky is a deep blue.

Kummler+Matter

K+M QUICK OVERVIEW

K+M FACTS SHEET



115 years

Excellence and innovation



160

highly skilled
employees



16

Countries



Certified and Experienced

ISO and Ecovadis certificates, numerous patents and partnerships, training company for the OHL in Switzerland.

Local / Global

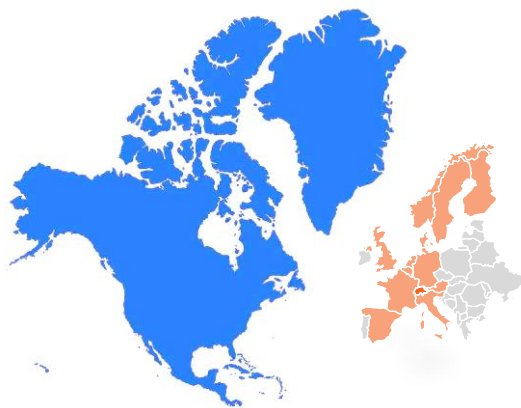
Switzerland

10+ Cities equipped with urban catenary systems

20+ Private railway companies

World

15+ Sales regions around the world, mainly
in Europe and North America.



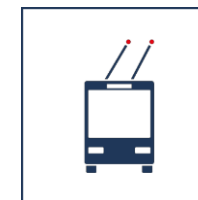
3 Segments



Railway

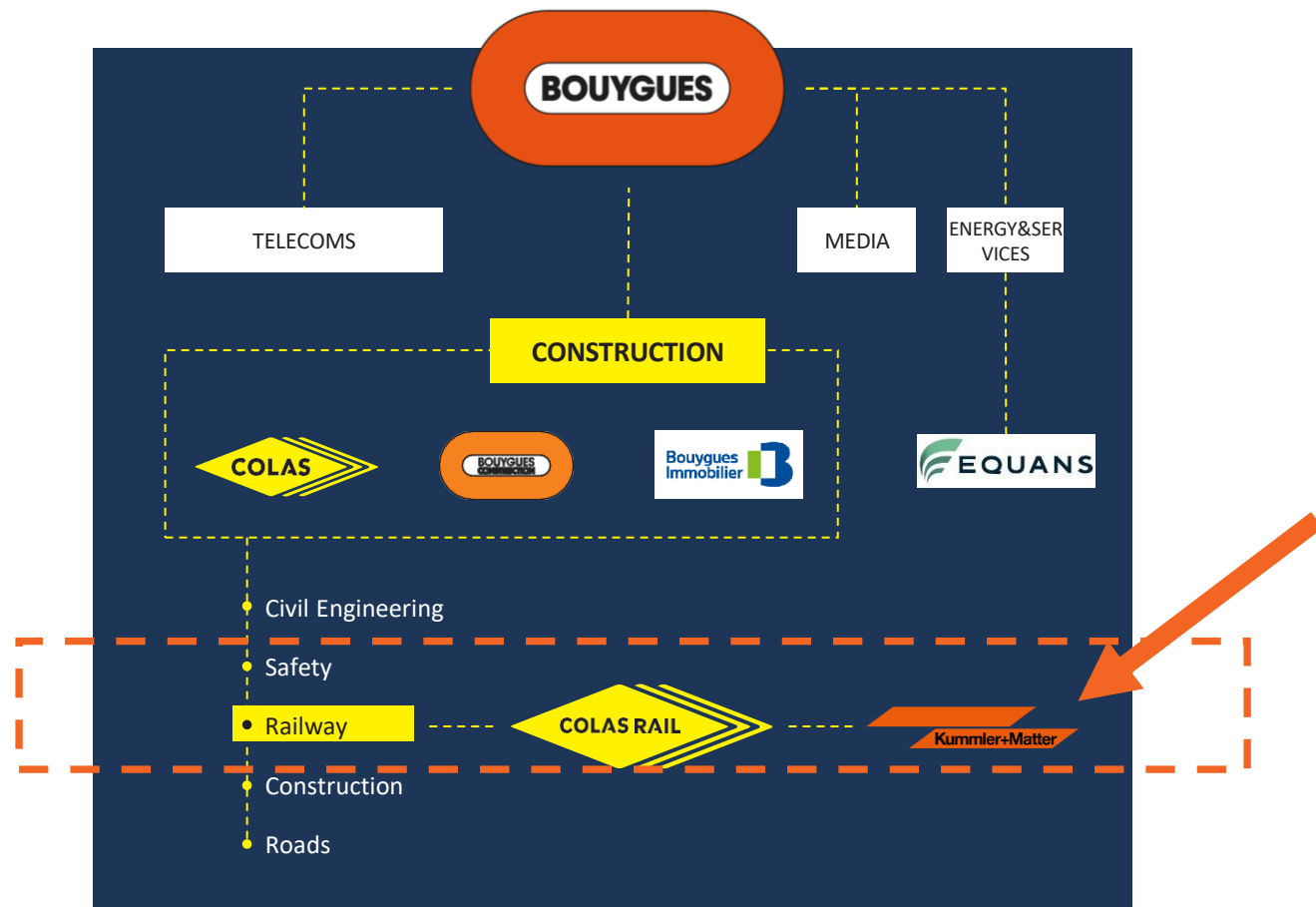
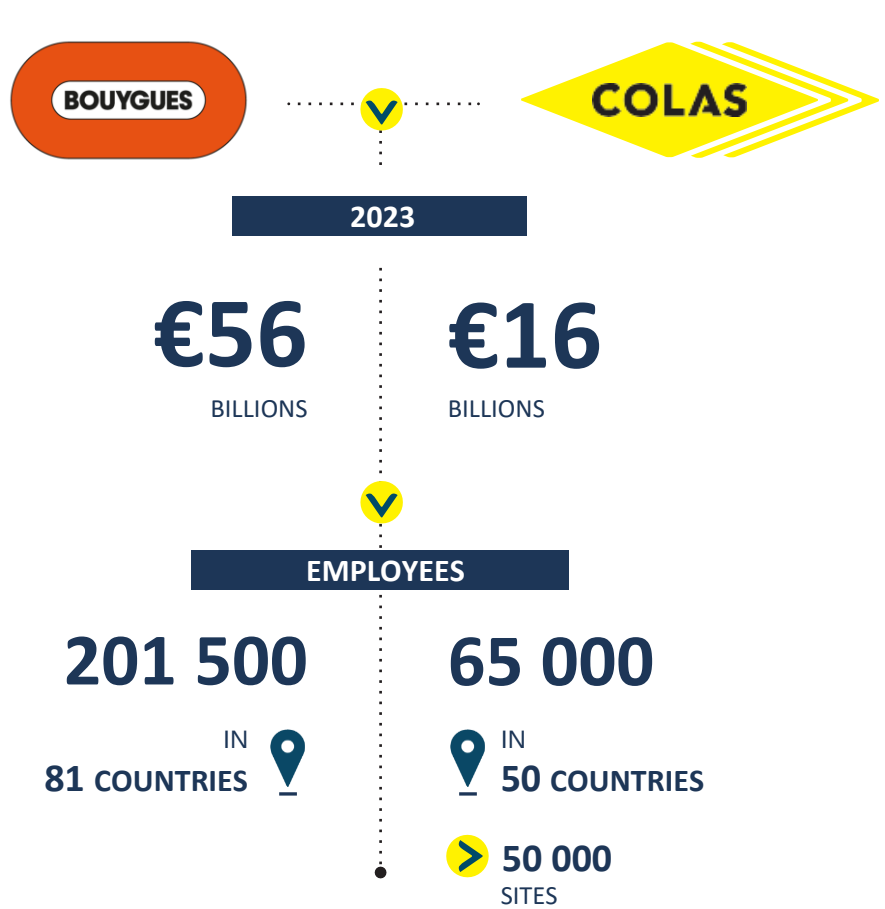


Tramway



Trolleybus

THE GROUP





**HOW DOES THE SUSTAINABILTY CONTRIBUTION
OF K+M LOOK LIKE?**

CONTRIBUTION OF KUMMLER+MATTER AG TO THE SUSTAINABILITY TRENDS OF TROLLEYBUSSES NETWORKS



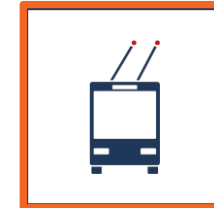
Excellence
and innovation



highly skilled
employees

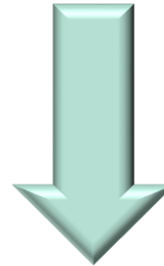


Local / Global



HOW DOES THE SUSTAINABILITY CONTRIBUTION
OF K+M LOOK LIKE?

4 cases



Case 1 - TB loading point solution

Case 2 – Reducing the perturbation effect in the data exchange of the switching control system

Case 3 - Preventive maintenance

Case 4 - Products development with recyclable and environment-friendly solutions



TROLLEYBUS LOADING POINT SOLUTION



TROLLEYBUS LOADING POINT SOLUTION

VEHICLE

Control Cabinet

Driver Panel



Charging power of TB trolleybuses battery with at least 200kW



Flexibility in extending the OHL network outside the city center.
Flexibility in reducing the OHL network within the city center.

BUS STOP

Loading Point

Signalisation



Thumb rule: 1min. charging corresponds to approx. 1km journey.



**REDUCING PERTURBATION EFFECT IN THE DATA
EXCHANGE OF SWITCHING CONTROL SYSTEM**

REDUCING PERTURBATION EFFECT IN THE DATA EXCHANGE OF THE SWITCHING CONTROL SYSTEM

ON-BOARD / MOVING INSTALLATION

Antenna Solution On-board / Moving

ROOT CAUSE FOR THE CHANGE – VEHICLE SIDE:
induced perturbations to the inductive system
through TB modulated power supply or
regenerative braking systems .

Transmit Coil
for current collector

Isolation transformer

Terminal

Infrared Solution On-board / Moving

Trolleybus

IR-Sender

BCD
Einheit

CONVERTED TO

CROSSING - WAYSIDE INSTALLATION

Antenna Solution way-side



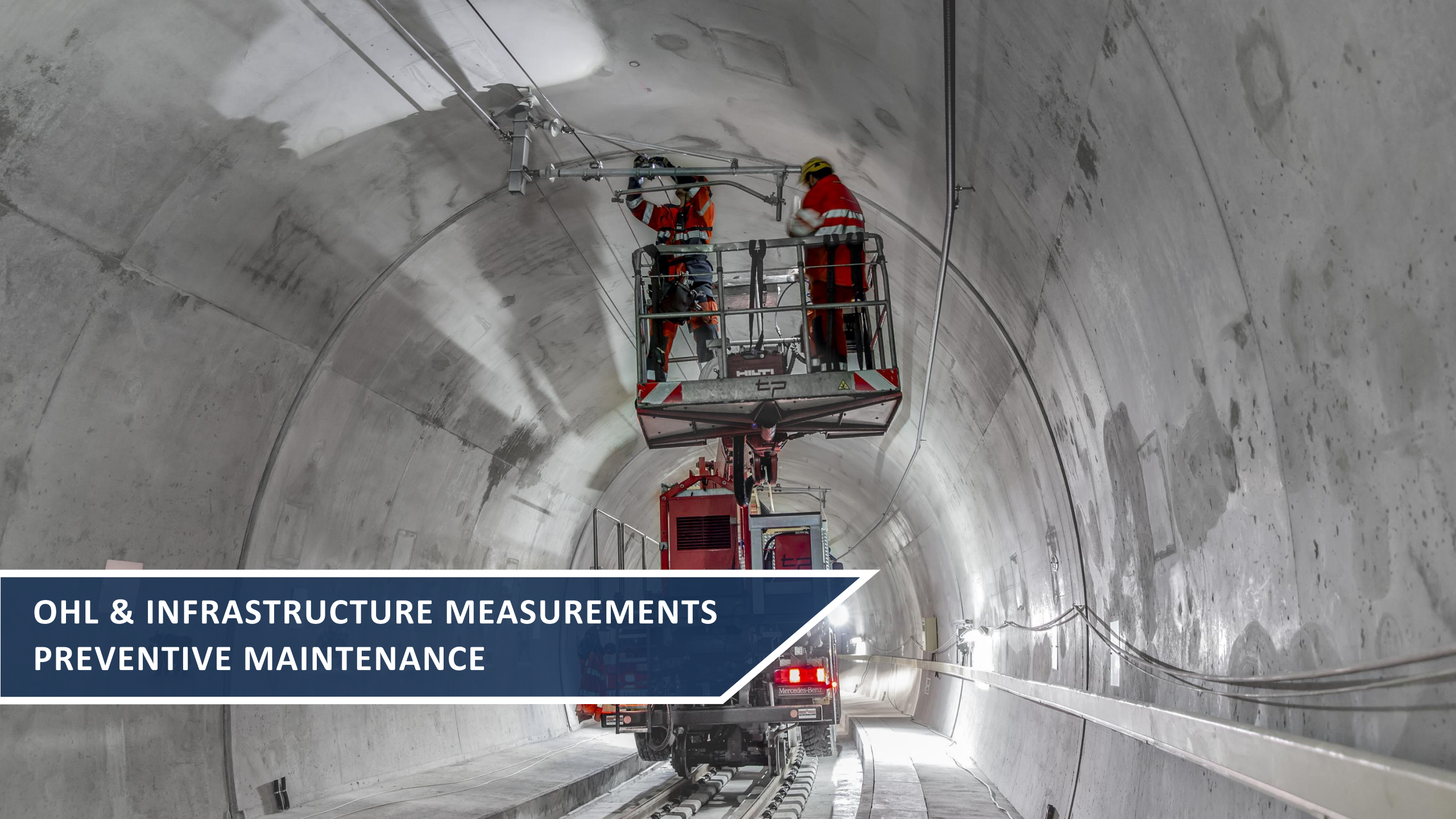
Infrared Solution way-side



CONVERTED TO



- less material used in the system
- little waste due to defective antennas
- Fit for the future through technology change



**OHL & INFRASTRUCTURE MEASUREMENTS
PREVENTIVE MAINTENANCE**

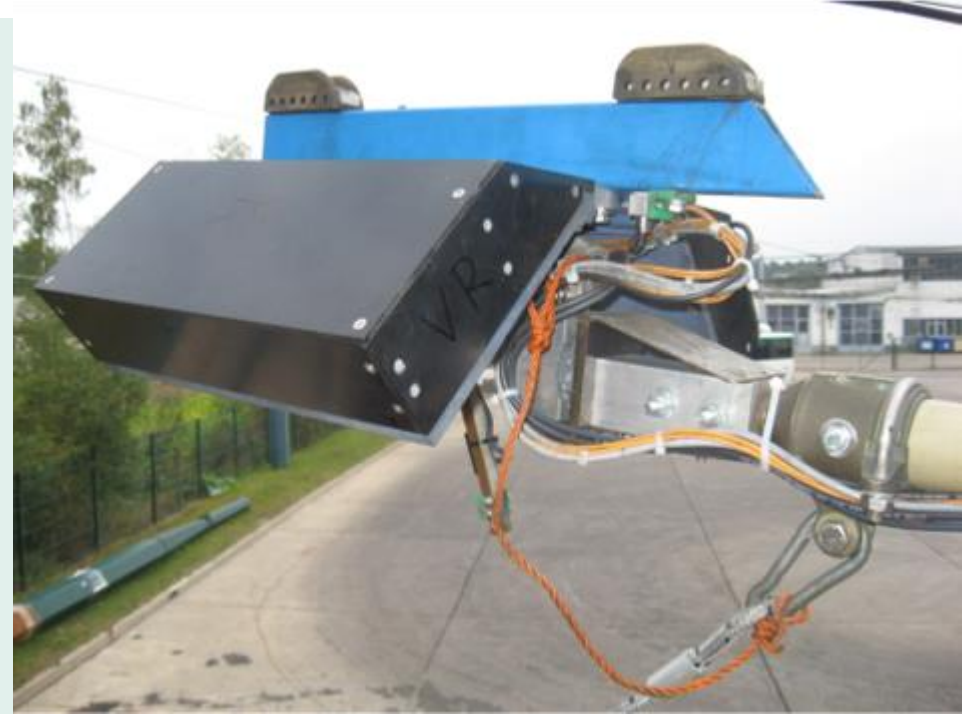
OHL & INFRASTRUCTURE MEASUREMENTS

PREVENTIVE MAINTENANCE

Accurate capture of the residual cross-section and **profile of trolleybus contact wires**, with the help of 2 lasers and 2 cameras.

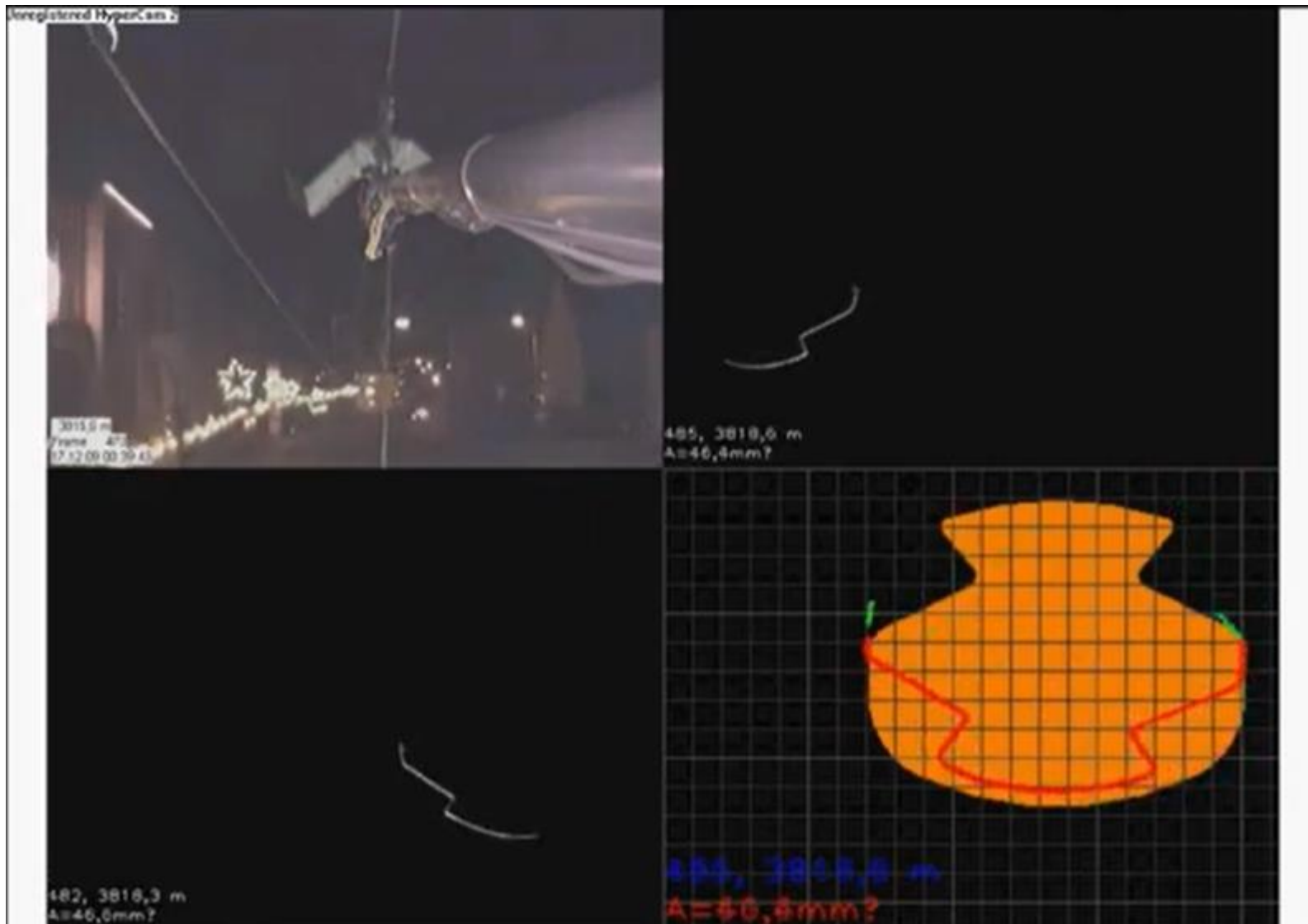
Following parameters are measured or calculated:

- ✓ Contact line **profile, angle** (torsion) and **height**
- ✓ Degree of contact line **wear** (residual height/section)
- ✓ Absolute **position** on the route (GPS coordinates and path) and **speed**



- Less waste through optimal use of contact line, and thus a contribution to the OHL system sustainability.
- Increased life cycle through periodical OHL preventive maintenance.

OHL & INFRASTRUCTURE MEASUREMENTS



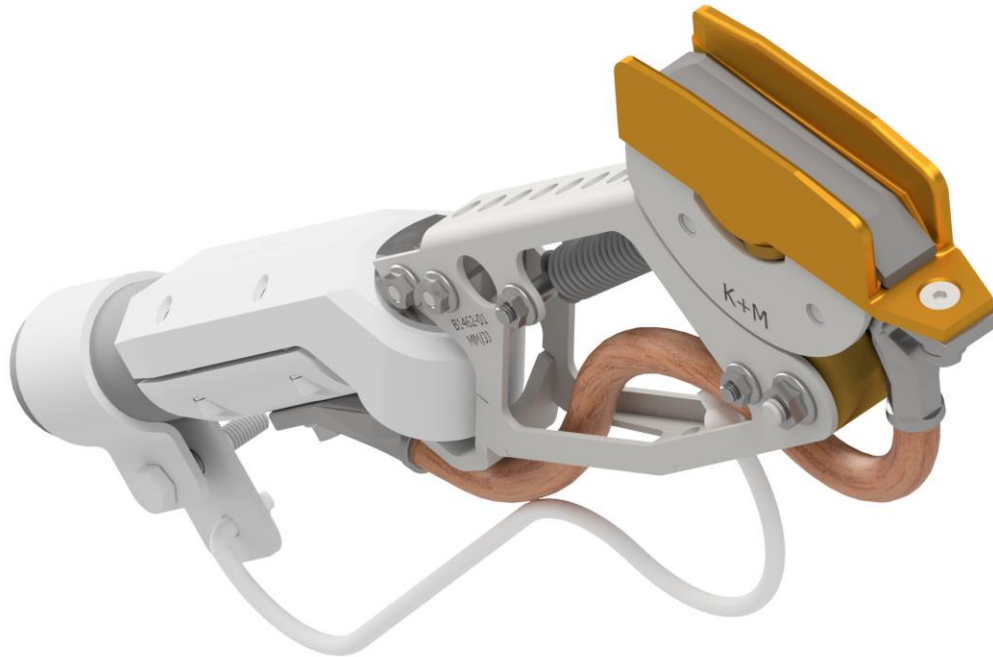


**PRODUCTS DEVELOPMENT WITH RECYCLABLE
AND ENVIRONMENT-FRIENDLY SOLUTIONS**

PRODUCTS DEVELOPEMENT – ENVIRONMENT FRIENDLY SOLUTIONS

KUCO 200 / KUCO 600

Current collectors with less wear and high continuous currents.



Products with longer life-time and reduced environmental impact, by:

- using recyclable materials
- and reducing the amount of waste.



THANK YOU FOR THE ATTENTION

23.10.2024, F. Fattel
Head of Sales International

Kummeler+Matter